

Patriot Excalibur Software Enables Full-Scale Deployment of Battle-Ready Units

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CROSSTALK

Whether during wartime deployment or peacetime record keeping of troops, being prepared for any eventuality is of utmost importance. Software that enables this war fighter preparation must be a simple tool set that encompasses all needs, a one-stop-shopping experience that can handle scheduling troop activity, provide easy access to needed data, and be a usable product that does what is needed.

Preparation for a wartime deployment often begins during peacetime. It can mean the difference between an organized, battle-ready unit and a unit that is still trying to schedule troops, order supplies, and prepare for battle. During a major deployment such as Operation Iraqi Freedom, currently under way, a disciplined tool set for scheduling aircraft, people, training, and flying must be in place. This tool set must also, in addition to providing all necessary information, be a *one-stop-shopping* experience that can handle day-to-day tasks, easily provide access to data, and combine these and other combat-capable assets together to provide the U.S. Air Force the ability to meet any threat.

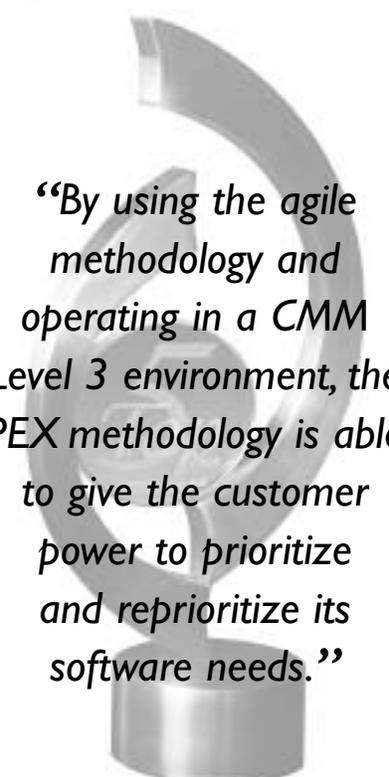
All this does not matter if the product sits on the shelf.

Patriot Excalibur (PEX) is software that is built from the bottom up with the warfighter in mind, according to PEX group lead Linda Crabtree. "The software is developed *for* the user – that was a core requirement. A product that does everything, but not in the way the user wants it done, sits on the shelf. Our product does not sit on the shelf."

The need was simple: Create a squadron-level automated environment where data entered in one application is usable throughout others, during both peacetime and wartime. The software must also keep the user in the loop, provide single- and multi-crew scheduling, enable single input of data, be interoperable with external systems, and be cost efficient. "We provide a squadron-level, PC-based tool set that helps aircrews conduct effective, timely operational tasks in an integrated, standardized system of products that connects the functional areas across the squadron," says Crabtree.

PEX's major design goals were to create a product based on commercial Microsoft standards, be configurable by individual units, be interoperable with

external systems and databases, and derive its program requirements by keeping the user in the development loop. "This is the first software [squadron automation package] I have seen that was tailored to meet all facets of a flying squadron's operations," says Master Sgt. Jeffrey Crawford, operations superintendent.



"By using the agile methodology and operating in a CMM Level 3 environment, the PEX methodology is able to give the customer power to prioritize and reprioritize its software needs."

An Organized Squadron

Squadron-level aircrew and aircraft scheduling during wartime deployment is usually accomplished with a different set of software tools than those used by the same unit at home during peacetime, according to Crabtree. "Learning a different set of tools during wartime deployment compounds the difficulty of an already stressful situation. It also adds to the *spin up* time needed to get ready, as a lot of raw data such as aircrew names, qualifications, aircraft data, and scheduling

parameters need to be input into the different scheduling systems."

Previous squadron automation software was adequate for basic aircrew scheduling functions, but was limited and did not offer the broad range of functions that defines PEX. "Previously, our aircrew entered all of their meetings or appointments into a Microsoft Excel spreadsheet or placed them on a dry-erase board," says Crawford. "Flight commanders had to print out this spreadsheet or consult the board in order to coordinate the weekly flying schedule."

PEX has the ability to interface with the Aviation Resource Management System (ARMS), providing several benefits, according to Crawford. PEX provides squadron decision makers with real-time aircrew training currency information; flight managers can pull currency information from the ARMS into PEX on a daily basis; the aircrew can view their training status from their desktop, and no longer have to request flight management personnel to run an ARMS report that shows what events are coming due.

PEX can also interface with the Core Automated Maintenance System, giving a squadron the ability to have real-time aircraft status on a desktop, something that was lacking from previous squadron packages. "From an aircrew scheduler's point of view," says Crawford, "PEX makes the job much easier. It provides one source for all of the information required to successfully run a squadron's flying operation."

Agile + CMM

Perhaps one of the most important aspects of PEX is the way it was developed – using not one development approach, but a combination of extreme programming (XP) or agile methodology, and the Capability Maturity Model® (CMM®). When PEX team first started looking into using XP, they agreed it was a great concept but given their current development environment did not think it

would be possible to incorporate. They were also concerned about maintaining their CMM Level 3 status.

A year later, PEX development team found themselves facing several obstacles: an inaccuracy in estimating development time, using antiquated techniques that did not fit their object-oriented development, and rapidly changing requirements. The development team was facing late delivery, overtime, and team turmoil.

After revisiting their methodology, a team member suggested looking at agile development, which is a collection of values, principles, and practices for software that can be applied to a development project. The team mutually agreed to revisit this development method, and from the beginning, agile/XP became the preferred method. After several meetings, the PEX development team unanimously agreed to make a change, but wanted to keep their CMM Level 3 processes. They decided that agile development was the method that would best accommodate the team's needs.

"The actual results of the change have exceeded my expectations," says Crabtree. "The stability of the product has increased dramatically, the amount of work accomplished has increased, the team is genuinely enthusiastic about coming to work, our estimation ability has improved and continues to improve, and our user numbers are increasing at an astounding rate."

By using agile methodology and operating in a CMM Level 3 environment, PEX methodology is able to give the customer the power to prioritize and reprioritize its software needs. "PEX team receives its requirements directly from its users," said Kelly Goshorn, PEX program manager. "This is a tremendous timesaver for the development team as far as understanding the requirements. PEX (team) also uses XP with two-week iterations and a six- to eight-week update, allowing functionality to continually be released to the field."

In the three months following the release of PEX v.3.2 in September 2003, the PEX office received three problem reports and 78 enhancement requests. PEX provides monthly metrics to the customer, and the software management tool VersionOne provides insight into individual member load, team load, and number of stories in each iteration and release.

PEX is a three-tier object-based client/server application that is written using Microsoft Visual Studio. The interfaces to the database use Active Data Object and Object-Linking and



The Patriot Excalibur structure interfaces easily with other service systems.

Embedding Database. User input is entered via the graphical user interface. With the release of v.3.2, PEX began providing Web-enabled modules. Several of these modules are both desktop and Web-enabled. PEX can also provide data to other applications from the database via Web services using Extensible Markup Language. PEX runs in a Windows NT Version 4, Windows 2000/XP environment. Due to the volatility of the requirements and the need for better estimation, PEX development has benefited tremendously from agile/XP development.

"116ACW was able to reorganize efficiently based on PEX," said Maj. Thomas J. McNeill, Wing PEX administrator and senior director. "It is impossible to determine the number of saved missions and hours of coordination and senior-level questions attributed specifically to the wing-wide implementation of PEX."

Cost Effective for the User

PEX is cost-effective for the user. Since the product is government-owned software developed by a contractor under a time-and-materials contract, it means Department of Defense personnel who have access to a <.mil> account can use PEX off the shelf at no cost. "Our customers have access to our team around the clock via our Web site, help-desk hotline, pexhelp mailbox, and feedback forms," said Crabtree. "We provide in-house training classes at no charge and send our operation specialists out to their site for the cost of the temporary duty only. We provide user support in a timely fashion at no charge."

"PEX was a significant increase in Nellis's [Air Force Base] scheduling capability with significant reduction in man-

hours," says 57WG Chief of Scheduling Maj. Charles Blank. "The entire team of PEX has been infinitely helpful. They have responded to every input Nellis users asked for and continue to provide outstanding support through the help desk."

Since the release of PEX v.3.2, its growth rate has steadily increased. Its user base has grown from 12 units two years ago to more than 100 today. One unit was commended for *looking to the future* for implementing PEX throughout the squadron, while another unit using PEX got an outstanding on their operational readiness inspection, with major credit going to PEX's Web usefulness. The PEX program is being embraced by squadrons all over the country, according to Goshorn. "There are approximately 100 units using PEX currently. The continuity gained for the units by using the same software is astronomical. A user can communicate from one squadron to another and be familiar with the product when arriving on station."

With all this functionality, PEX is a valuable asset to the Air Force, providing the warfighter with needed tools to meet any threat. "The only limiting factor of PEX," says McNeill "is the fact that not everyone is using it."◆

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